**TENTATIVE**
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM
ORDER NO. R5-2005-____
FOR
INDIVIDUAL DISCHARGERS
UNDER
ORDER NO. R5-2005-____
INDIVIDUAL CONDITIONAL WAIVER OF
WASTE DISCHARGE REQUIREMENTS
FOR
DISCHARGES FROM IRRIGATED LANDS



As stipulated by the *Individual Discharger Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands, Order No. R5-2005-____ (*Individual Discharger Conditional Waiver*)*, Individual Dischargers shall develop and implement a monitoring program to assess the effects on water quality of waste discharged from irrigated lands to surface water , and where necessary, to track progress of existing or new management practices implemented to reduce the amount of waste discharged that affects the quality of the waters of State and their beneficial uses.

The California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) adopts this Monitoring and Reporting Program (MRP) pursuant to California Water Code (Water Code) Sections 13267 and 13269. The reports required by this MRP are necessary to evaluate the effects on water quality of waste discharges to waters of the State and to determine compliance with the terms and conditions of the Individual Discharger Conditional Waiver. The Central Valley Water Board Executive Officer may revise the MRP as appropriate. Dischargers shall comply with the MRP as revised by the Executive Officer.

This MRP describes the conditions that must be addressed in an acceptable Individual MRP Plan. The purpose of the MRP Plan is to monitor the discharge of waste in irrigation return flows and stormwater from irrigated lands that are enrolled under the Individual Discharger Conditional Waiver. Dischargers shall prepare and submit to the Central Valley Water Board for review and approval by the Executive Officer a MRP Plan that meets the minimum conditions of this MRP and includes proposed monitoring sites, frequency of monitoring, parameters to be monitored, and documentation of monitoring protocols. The MRP Plan will be reviewed to determine if it meets or exceeds the minimum requirements of this MRP. The submittal of an acceptable MRP Plan is a condition of the Individual Discharger Conditional Waiver.

The development of a science-based water quality monitoring program is critical to determine actual and potential effects on water quality of waste discharges from irrigated lands on beneficial uses of waters of the state in the Central Valley Region. Determining the existing ecological conditions of agricultural-dominated water bodies in the Central Valley Region is a critical goal of a water quality monitoring program and should be achieved by multiple assessment tools such as toxicity, chemical monitoring and bioassessments, as necessary. The MRP Plan is a part of the Central Valley Water Board Irrigated Lands Conditional Waivers Program to assess the effects on water quality of these discharges on waters of the State.

## I. MONITORING REQUIREMENTS

Individual Dischargers shall submit to the Central Valley Water Board a detailed MRP Plan that supports the development and implementation of a monitoring plan and demonstrates the effectiveness of the MRP Plan to comply with conditions of the Individual Discharger Conditional Waiver.

The MRP Plan shall be designed to achieve the following objectives as a condition of the Individual Discharger Conditional Waiver:

a. Assess the effects on water quality of waste discharges from irrigated lands to waters of the State;
b. Determine the degree of implementation of management practices to reduce discharge of specific wastes that degrade water quality;
c. Determine the effectiveness of management practices and strategies to reduce discharges of wastes that degrade water quality;
d. Determine concentration and load of waste in these discharges to waters of the State; and
e. Evaluate compliance with receiving water limitations to determine if additional implementation of management practices is necessary to improve and/or protect water quality.

In order to focus the monitoring effort in a cost effective and efficient manner, the monitoring process needs to use various assessment tools (i.e. chemical monitoring, toxicity testing, and bioassessments). A conference sponsored by the California Water Institute entitled "*Understanding Surface Water Monitoring Requirements*" provides excellent guidance on the use of various monitoring tools (California Water Institute, 2002).

### A. Historical Data

Where available, any historical land use information or existing environmental monitoring data should be provided in the MRP Plan. This information may help determine appropriate monitoring strategies for the Discharger.

### B. Types of Monitoring and Evaluation

To achieve the objectives of the MRP, at a minimum, the Discharger shall discuss farm specific monitoring and evaluation program in the MRP Plan, which includes the following:

1. Chemical Use Evaluation;
2. Water Quality (constituents listed in Table 1) and Flow Monitoring;
3. Toxicity Testing, as necessary; and
4. Management Practice Effectiveness and Implementation Tracking.

These testing requirements are described below:

1. Chemical Use Evaluation

   The MRP Plan shall identify all chemicals, including pesticides, fertilizers, and other soil amendments used on the farm both currently and within the last five years. The MRP Plan Chemical Use Evaluation shall address the timing of pesticide applications, the application rates,

the amounts of pesticide applied, and the points of application (all of these factors can be referred to as "use pattern"). The MRP Plan can use pesticide use reports submitted by the applicators to the County Agricultural Commissioners and Department of Pesticide Regulations as part of the Chemical Use Evaluation, as well as individual farm records.

2. Water Quality and Flow Monitoring

Water quality and flow monitoring shall be used to assess the sources of wastes and loads in discharges from irrigated lands to surface waters and to evaluate the effectiveness of management practice implementation efforts. Monitoring data shall be compared to existing numeric and narrative water quality objectives.

3. Toxicity Testing

Toxicity monitoring may be required based on the use of chemicals on the farm. The purpose of the toxicity testing is to evaluate water quality, primarily through the use of aquatic species toxicity testing, to evaluate compliances with narrative toxicity objectives, to identify the causes (e.g., sediment, contaminants, salt, etc.) of toxicity observed, and to determine the sources of toxicants identified. To determine if the farm management program is achieving the goals and objectives identified during planning, including whether the water body is maintaining the conditions that are improving and/or protective of beneficial uses.

Acute toxicity testing shall be conducted using the invertebrate *Ceriodaphnia dubia* (water flea) and the larval fathead minnow *Pimephales promelas* according to standard USEPA acute toxicity test methods[1]. In addition, to identify toxicity caused by herbicides, 96-hour toxicity tests with the green algae *Selenastrum capricornutum* shall be conducted[2]. The water column toxicity testing will be used as an indicator for wastes that are water-soluble. Sediment toxicity testing using the invertebrate species *Hyalella azteca* or *Chironomus tentans* according to USEPA methods[3] shall be conducted for hydrophobic (sediment bound) wastes that are present in the water body.

For this initial screening, 100% (undiluted) sample shall be tested. If, during the initial toxicity screening, a 50% or greater difference in test organism mortality is detected at any time between an ambient sample (i.e., from a stream site) and the laboratory control during an acceptable *Ceriodaphnia dubia* or *Pimephales promelas* test, or a 50% or greater reduction in test organism growth is detected between an ambient sample (i.e., from a stream site) and the laboratory control at the end of an acceptable *Selenastrum capricornutum* test, then a Toxicity Identification Evaluation[4] (TIE) and chemical monitoring shall be conducted on that same sample. The

[1] USEPA. 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. Office of Water, Washington, D.C. EPA-821-R-02-012.
[2] USEPA. 2002. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition. Office of Water, Washington, D.C. EPA-821-R-02-013.
[3] USEPA. 1994. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates. Office of Research and Development, Washington, D.C. EPA-600-R-94-024.
[4] A TIE is a set of sample manipulation procedures designed to identify the specific causative agent(s) responsible for the observed toxicity.

laboratory must immediately begin the TIE once a 50% or greater mortality or difference in growth is observed in the toxicity sample. At a minimum, a Phase I TIE[5] should be conducted to determine the general class (i.e., metals, non-polar organics such as pesticides, surfactants, etc.) of the chemical causing toxicity. This minimum TIE effort will determine the type of chemical monitoring necessary to identify the specific agents causing toxicity. Phase II[6] TIEs may also be utilized to identify specific toxic agents.

If at any point during the initial toxicity screening the mortality reaches 100%, a multiple dilution test is required. A multiple dilution test on the same sample must include a minimum of five (5) sample dilutions. The TIE will be conducted to determine the cause of toxicity and the multiple dilution test will determine the magnitude of the toxic response. Sites identified as toxic (statistically different from the laboratory control) in the initial screen shall be re-sampled to estimate the duration of the toxicant in the water body. Additional samples collected upstream of the original site should also be collected to determine the potential source(s) of the toxicant in the watershed. See Section I.F *Minimum Analytical Monitoring Requirements* for toxicity sampling schedule and timing for required re-sampling.

4. Management Practice Effectiveness and Implementation Tracking

   Information must be collected on the type of management practices that are being used, and how effective they are in protecting surface waters. Data should be collected in four broad areas: 1) pesticide mixing and loading and application practices; 2) pest management practices; 3) management practices to address other wastes (salt, sediment, nitrogen, etc.); and 4) cultural practices. This information should be used to compare the effectiveness of management practices in reducing loading of one or more wastes that have been identified to effect surface waters.

## C. Monitoring Sites

The MRP plan shall describe the farm area as it relates to discharge points, sampling location(s), GPS coordinates, land use, the chemicals being used and the existing management practices. Monitoring sites should not include main-stem water bodies already on the Clean Water Act Section 303(d) List. The initial focus of the MRP Plan shall be on water bodies that carry agricultural drainage or are dominated by agricultural drainage. The MRP Plan shall include a map showing the monitoring sites.

## D. Monitoring Seasons

Monitoring shall be conducted during the irrigation and storm seasons. In general, the irrigation season is March through August, but may start as early as February and extend to October. The storm season is December through February, but may include November and March. The MRP Plan shall describe the irrigation and storm seasons, propose specific irrigation and storm season monitoring periods for the

[5] USEPA. 1998. Methods for Aquatic Toxicity Identification Evaluations. Phase I Toxicity Characterization Procedures. Office of Research and Development, Duluth, MN. EPA-600-3-88-034.
[6] USEPA. 1998. Methods for Aquatic Toxicity Identification Evaluations. Phase II Toxicity Identification Procedures. Office of Research and Development, Duluth, MN. EPA-600-3-88-035.

region, and discuss when peak irrigation and storm discharges are likely to occur.

## E. Monitoring Schedule

The MRP Plan shall be carried out using a systematic schedule. The MRP Plan should indicate the start date, identify time of the year, identify when field studies will take place, define the frequency of sampling, and indicate when the field studies end. Timing, duration, and frequency of sampling should be based on the complexity, hydrology, and size of the farm and it's discharge points. The MRP Plan must include a sufficient number of monitoring sites and surface water flow monitoring for each location to allow calculation of the load discharged for appropriate parameters. The Dischargers shall propose an evaluation of which chemicals should be monitored during the term of the Individual Discharger Conditional Waiver.

At a minimum, the monitoring shall be conducted during and after one storm event, and quarterly sampling during the peak irrigation season to determine the concentration and loads of wastes discharges from the farm during the term of the Individual Discharger Conditional Waiver, unless otherwise approved by the Executive Officer.

## F. Minimum Analytical Monitoring Requirements

Table 1 lists the minimum requirements for the constituents to be monitored by the Individual Discharger, in accordance with the footnotes. The constituents, parameters, and tests listed in the table are needed to effectively evaluate water quality and to characterize agricultural discharges.

**Table 1. Minimum Analytical Monitoring Requirements**

| Constituents, Parameters, and Tests | Analytical Methods | Maximum PQL(a) | Reporting Unit | Required Parameter (b) |
|---|---|---|---|---|
| **Physical Parameter** | | | | |
| Flow | Calculated | 1 | cfs | Yes |
| pH | SM 4500 H+B or EPA 150.1 | 0.1 | pH units | Yes |
| Electrical Conductivity | EPA 9050A or EPA 120.1 | 100 | µmhos/cm | Yes |
| Dissolved Oxygen | SM 4500 | 0.1 | mg $O_2$/L | Yes |
| Temperature | SM 2550 | 0.1 | °Celsius | Yes |
| Color | SM 2120B | 5 | Color Unit | Yes |
| Turbidity | SM 2130B or EPA 180.1 | 1 | NTUs | Yes |
| Total Dissolved Solids | SM 2540C or EPA 160.1 | 10 | mg/L | Yes |
| Total Organic Carbon | SM 5310C or EPA 415.1 | 0.5 | ug/L | Yes |
| **Drinking Water** | | | | |
| fecal coliform | SM 9221B/F or SM 9223 | 2 | MPN/100ml | Yes |
| Total Organic Carbon | SM 5310C or EPA 415.1 | 0.5 | ug/L | Yes |
| **Toxicity Test (c)** | | | | |
| Algae Toxicity | EPA-821-R-02-013 | NA | % Growth | Yes |
| Water Column Toxicity (2 species) | EPA 821-R-02-012 | NA | % Survival | Yes |
| Sediment Toxicity (d) | EPA 600-R-99-064 | NA | % Survival | Yes |
| **Pesticides (e)** | various | various | ug/L | Yes – If used |

| Constituents, Parameters, and Tests | Analytical Methods | Maximum PQL(a) | Reporting Unit | Required Parameter (b) |
|---|---|---|---|---|
| **Metals** | | | | |
| Arsenic | EPA 200.7, 200.8, or 206.3 | 1 | ug/L | Yes |
| Boron | EPA 200.7 or 200.8 | 10 | ug/L | Yes |
| Cadmium | EPA 200.7, 200.8, or 213.2 | 0.1 | ug/L | Yes |
| Copper | EPA 200.7, 200.8, or 220.2 | 0.5 | ug/L | Yes |
| Lead | EPA 200.7, 200.8, or 239.2 | 0.5 | ug/L | Yes |
| Nickel | EPA 200.7, 200.8, or 249.2 | 1 | ug/L | Yes |
| Selenium | EPA 200.7, 200.8, or 270.3 | 1 | ug/L | Yes |
| Zinc | EPA 200.7, 200.8, or 289.2 | 1 | ug/L | Yes |
| **Nutrients (f)** | | | | |
| Total Kjeldahl Nitrogen | EPA 351.2 or 351.3 | 500 | ug/L | Yes |
| Nitrate as Nitrogen | EPA 300.1 or 353.2 | 50 | ug/L | Yes |
| Nitrite as Nitrogen | EPA 300.1 or 353.2 | 50 | ug/L | Yes |
| Ammonia | EPA 350.3 or SM4500 NH3 | 100 | ug/L | Yes |
| Hardness | SM 2340 or EPA 130.1 | 10,000 | ug/l | Yes |
| Total Phosphorous | EPA 365.1, 365.4, or SM 4500-P | 50 | ug/L | Yes |
| Soluble Orthophosphate | EPA 300.1, 365.1, or SM 4500-P | 50 | ug/L | Yes |
| ***SEDIMENT SAMPLING*** **(d)** | | | | |
| Pesticides – Pyrethroids (g) | | | | |
| Biphenthrin | EPA 1660 or EPA 8081A | 1.0 | ug/kg | Yes |
| Cyfluthrin | EPA 1660 or EPA 8081A | 1.0 | ug/kg | Yes |
| Cypermethrin | EPA 1660 or EPA 8081A | 1.0 | ug/kg | Yes |
| Esfenvalerate | EPA 1660 or EPA 8081A | 1.0 | ug/kg | Yes |
| Lambda-Cyhalothrin | EPA 1660 or EPA 8081A | 1.0 | ug/kg | Yes |
| Permethrin | EPA 1660 or EPA 8081A | 1.0 | ug/kg | Yes |

a The methods and PQLs are reasonable goals in terms of laboratory availability and capability, and the Individual Dischargers should strive to meet them. If the Individual Discharger's contract laboratory proposes alternative methods or PQLs, the proposed alternatives and rationale for the changes must be detailed in the QAPP. Any alternative PQL must be approved by the Executive Officer prior to use.

b Only parameters used on the farm should be analyzed unless otherwise noted. Use may be indirect as inert ingredient in farm chemicals. The required detection limits are available from the Central Valley Water Board upon written request. Toxicity testing is required to be conducted during storm and irrigation seasons.

c In addition to TIEs, sites identified as toxic in the initial screening shall be re-sampled (as required in Section I.F *Minimum Analytical Monitoring Requirements*) to estimate the duration of the toxicant in the water body. Additional samples upstream of the original site should also be collected to determine the potential source(s) of the toxicant in the watershed. The sampling volume submitted to the laboratory shall be twice the volume needed for the toxicity test. The chain-of-custody forms sent to the laboratory shall include a note that the additional volume of sample is for the TIE, if results show TIE is required.

d Sediment Monitoring frequency is one sample during the irrigation season and one sample during the storm season.

e Pesticides that have been used within the prior five years, currently used, and planned for use shall be monitored using procedures approved by the Central Valley Water Board Executive Officer.

f Alternative methods may be used for analysis of nutrients provided the methods are approved by the National Environmental Laboratory Accreditation Program. Alternative methods must be included in the QAPP and are subject to approval by the Executive Officer.

g Laboratory shall report values between the PQL and method detection limit as estimated and flag with a "j" qualifier.

| | | | |
|---|---|---|---|
| PQL | Practical Quantitation Limit | MPN | Most Probable Number |
| cfs | cubic feet per second | NTU | Nephelometric turbidity unit |
| mg/L | milligrams per liter | ug/L | micrograms per liter |
| ml | milliliters | mg | milligrams |
| µmhos/cm | micromhos per centimeter | NA | Not applicable |
| H+B | Hydrogen ion analysis, Section B | | |

Monitoring must include chemicals that are added to agricultural lands (e.g., pesticides, herbicides) to enhance crop production, constituents that are formed as a result of agricultural land use practices such as total dissolved solids, total organic carbon, and other constituents that may be leached from the land. The MRP Plan must include a sufficient number of monitoring sites and surface water flow monitoring for each location to allow calculation of the load discharged for each waste parameter monitored.

Method detection limits and practical quantitation limits shall be reported. All peaks detected on chromatograms shall be reported, including those, which cannot be, quantified and/or specifically identified. The Discharger shall use USEPA approved methods, provided the method can achieve method detection limits equal to or lower than analytical methods quantitation limits specified in this MRP. At a minimum, the MRP Plan must include (1) all chemicals used on the farm; (2) sufficient monitoring sites based on acreage, flow monitoring, and frequency of sample collection to allow for calculation of load discharged for waste parameters monitored; and (3) measurements of water quality parameters such as temperature, electrical conductivity, pH, and dissolved oxygen. Proper sampling techniques must be used to ensure a sample is representative of the flow in the cross section. All data must be submitted to Program staff in Surface Water Ambient Monitoring Program (SWAMP) comparable format.

For each exceedance, the Individual Discharger shall re-sample the monitoring site with the reported exceedance(s) and two sites located upstream of the monitoring site with the exceedance (a total of three samples) for each constituent that exceeds a receiving water limitation or water quality objective within 72-hours of submittal of the Exceedance Report (see Section III.B.1 for Exceedance Report requirements). The laboratory shall be requested to analyze the three samples for the constituent(s) representing the exceedance in the original sample and any parameter needed to evaluate the results with the water quality objectives (i.e., hardness). This re-sampling strategy will continue for each exceedance detection in the re-sampling results, until all reported results are below the receiving water limitation that implements the appropriate Basin Plan's water quality objective. The Individual Discharger shall provide the GPS coordinates for each of the re-sampling locations.

Representative flow measurements shall be obtained at each sample location during each sampling event. Additionally, the presence or absence of flow at each sample site shall be noted on a daily basis during the irrigation season. The MRP Plan shall record the time, date, and location of each flow measurement or observations if there is flow on field data sheets. An example field data sheet is provided in **MRP Attachment A**. Discharge flow monitoring shall be conducted and shall be reported in cubic feet per second.

Studies must characterize the beneficial use impairments of the receiving water bodies due to agricultural runoff. The MRP Plan shall include all of the individual pesticides if they are used by the Discharger. The MRP Plan does not need to include individual pesticides if they are not used by the Discharger.

All pesticides monitored must be reported at a quantitation limit below the receiving water limitation or less than one-tenth the LC50, whichever is lower. The quantitation limits reported by the laboratory must be supported by the detection limit study as described in the Quality Assurance Project Plan (QAPP), **MRP Attachment B**, which is attached hereto and made part of this MRP by reference.

All sampling methods shall have documented protocols. The MRP Plan must include all field and laboratory procedures as stated in this MRP and **MRP Attachment B.**

## II. QUALITY ASSURANCE PROJECT PLAN

To create a sound and consistent MRP Plan, it is important to develop monitoring protocols and a monitoring plan to evaluate the water quality data. A QAPP must be developed by the Discharger or others to include quality assurance components of the monitoring program. An Individual Discharger QAPP is required to be submitted with the MRP Plan. SWAMP QAPP is a comprehensive quality assurance plan that includes many of the elements required under this MRP. **MRP Attachment B** presents the MRP QAPP requirements and the outline for development of the monitoring QAPP. The QAPP includes the laboratory and field requirements to be used for data evaluation. Elements of the SWAMP QAPP may be used as an available resource to build the foundation of the QAPP. The addition of site-specific requirements and other elements that are required under this MRP will be necessary to build a comprehensive QAPP applicable to this program.

## III. REPORTING REQUIREMENTS

Pursuant to Water Code Section 13267, the following reports are required to be submitted to the Central Valley Water Board by a time schedule established by the Executive Officer.

### A. MRP Plan

The Discharger shall develop and submit to the Central Valley Water Board a MRP Plan. The MRP Plan must include the components of the monitoring program as stated in this MRP. At a minimum, the MRP Plan shall include the following elements:

1. Discharger name, address and phone number (owner and/or operator);
2. Map(s) of irrigated lands generating the discharge to waters of the State. Maps shall include points of discharge (surface or subsurface discharges);
3. Crops commonly grown;
4. Chemicals (pesticides, fertilizers, etc.) commonly applied in a manner that may result in the material coming in contact with irrigation water or stormwater;
5. Management practices utilized for reducing or eliminating adverse discharges of constituents of concern;
6. Identification of water bodies that could receive the discharge, including irrigation supply canals;
7. Describe irrigation and storm seasons, propose specific irrigation and storm season monitoring, and discuss when peak irrigation and storm discharges are likely to occur;
8. Description of any subsurface drainage collection system;
9. Summary of the water quality historical data for the farm;
10. Monitoring site(s);
11. Land use description;
12. Monitoring periods and start date of monitoring program;

13. Monitoring parameters, including minimum and site specific;
14. A QAPP consistent with the requirements described in **MRP Attachment B**;
15. Documentation of monitoring protocols including sample collection methods and laboratory quality assurance manual;
16. Management practice monitoring elements to determine effectiveness in meeting the conditions of the Individual Discharger Conditional Waiver; and
17. Signed Transmittal letter.

**B. Technical Reports Based on Receiving Water Limitation Exceedances**

Dischargers shall be responsible for providing technical reports if monitoring results show exceedances of receiving water limitations. The following reports are designed to notify Central Valley Water Board staff of the exceedance, identify the next steps to be taken and a schedule to address the exceedance, and evaluate management practices to determine their effectiveness in preventing future exceedeances.

1. Exceedance Report

   When the Discharger determines that receiving water limitations or water quality objectives are exceeded at a monitoring location(s), the Discharger shall submit an Exceedance Report to the designated Central Valley Water Board staff assigned to the Discharger by email or fax (916-464-4780) within the next business day describing the exceedance, the follow-up monitoring, and analysis or other actions the Discharger may take to address the exceedance. The Discharger determination of a water quality exceedance shall occur no later than five (5) business days after receiving the laboratory analytical report.

2. Communication Report

   The Discharger shall submit a Communication Report within 45 business days of the Exceedance Report. The Communication Report will describe the follow-up monitoring and analyses that were conducted, what actions were taken to identify the source of the problem, complete analytical laboratory results, and a time schedule to identify and implement the management practices as described in Section I.B.4 *Management Practice Effectiveness and Implementation Tracking* of this MRP and/or other measures to correct the problem, and to submit an Evaluation Report.

3. Evaluation Report

   The Evaluation Report shall be submitted in accordance with the time schedule submitted in the Communication Report or as directed by the Executive Officer. The Evaluation Report shall include, at a minimum, description of management practice(s) or other measures implemented, target chemical(s), reasons for implementing the specific practice or measure, and methodology for evaluating the effectiveness of the practice or measure (including sampling and quality assurance/quality control plans).

## C. Monitoring Reports

The monitoring reports shall be submitted by **30 June** (Storm Season Monitoring Report), covering the period of 1 November through 30 April, and **31 December** (Irrigation Season Monitoring Report), covering the period of 1 May through 31 October, and of each year. Each monitoring report shall include the following components:

1. Signed Transmittal letter;
2. A title page;
3. Table of contents;
4. Description of the farm;
5. Monitoring objectives;
6. Sampling site descriptions;
7. Location map of sampling sites and land use;
8. Tabulated results of analyses;
9. Sampling and analytical methods used;
10. Copy of chain-of-custody forms;
11. Associated laboratory and field quality control samples results;
12. Summary of precision and accuracy;
13. Chemical use reports and verification of application timing and locations;
14. Data interpretation including assessment of data quality objectives;
15. Summary of management practices used on the farm;
16. Actions taken to mitigate water quality impairments identified, including but not limited to, revised or additional management practices to be implemented;
17. Summary of Exceedance, Communication, Evaluation, and follow-up reports submitted during the year; and
18. Conclusions and recommendations.

Copies of all field documentation and laboratory original data must be included in the monitoring reports as attachments. The monitoring reports need to provide a perspective of the field conditions at sampling times including a description of the weather, rainfall, temperature, stream flow, color of the water, odor, and other relevant information that can help in data interpretation.

In reporting monitoring data, the Discharger shall arrange the data in tabular form so that the required information is readily discernible. An example table for providing tabulated monitoring results is provided in **MRP Attachment C**. The data shall be summarized in such a manner to clearly illustrate compliance with the conditions of the Individual Discharger Conditional Waiver.

Submittal of the corresponding field and laboratory data shall be included in each monitoring report. The data must be submitted in a SWAMP comparable format. The data must include all sample results as well as field and laboratory quality control, including toxicity analysis replicates and in-test water quality parameters.

A transmittal letter shall accompany each report. This letter shall include a discussion of any issues or data that indicates the discharge(s) is not in compliance with the terms and conditions of the Individual

Discharger Conditional Waiver found during the reporting period, and actions taken or planned to correct water quality impairments, such as operational, field or facility modifications. The transmittal letter shall be signed and contain a penalty of perjury statement by the Discharger. This statement shall state:

> *"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."*

The Executive Officer can request the Discharger to take additional actions if monitoring data indicates the receiving water limitations are exceeded in waters of the State. The Executive Officer may also increase the monitoring requirements where monitoring results, chemical use patterns, or other indicators suggest that the increase is warranted.

Based on results of the monitoring program after a minimum of one year, the Discharger may submit a revised MRP Plan requesting a reduction in the constituents monitored and/or sample frequency. If such reductions are warranted, the revised MRP may be approved by the Executive Officer.

The Discharger shall implement the above monitoring program in accordance with the date provided in the Notice of Applicability (NOA). For Individual Dischargers that have already received a NOA, the above monitoring program shall be implemented within 60 days as of the date of this MRP.

Ordered by: _____
THOMAS R. PINKOS, Executive Officer

_____
(Date)

**MRP Attachment A** – Example field data sheet
**MRP Attachment B** – Quality Assurance Project Plan
**MRP Attachment C** – Example Table For Providing Tabulated Monitoring Results

| **MRP Attachment A Example Field Data Sheet (Water Chemistry Samples & Probe)** | | One sheet per Monitoring Location per Sampling Event | Pg of Pgs |
|---|---|---|---|
| **Monitoring Location Name:** | Date (mm/dd/yyyy): | Season: (Irrigation or Dormant) | **Irrigated Lands Conditional Waiver Program** |
| **Coalition or Individual Name (Abbreviations are OK)** | Sample Time: | Sampling Crew Names (First Initial. Last Name) | |

| **Field Observations** | **Circle Your Observations** | WADEABILITY: YES / NO | BEAUFORT SCALE: | | WIND DIRECTION (from): | N W E S | **PHOTOS** (File Names..If sent to Regional Water Board) (RB=Right Bank US=Upstream) |
|---|---|---|---|---|---|---|---|
| DOMINANTSUBSTRATE: | Concrete,Cobble,Gravel,Sand,Mud,Other_____,unk | | | | | | |
| SITE ODOR: | None,Sulfides,Sewage,Petroleum,Mixed,Other_____ | SKY CODE: | Clear, Partly Cloudy, Overcast, Fog, Hazy | | | | 1: (RB / LB / BB / US / DS / ##) |
| OTHERPRESENCE: | Vascular,Nonvascular,OilySheen,Foam,Trash,Other___ | PRECIPITATION: | None, Foggy, Drizzle, Rain, Snow | | | | |
| WATERODOR: | None, Sulfides, Sewage, Petroleum, Mixed, Other____ | PRECIPITATION (last 24 hrs): | Unknown, <1", >1", None | | | | 2: (RB / LB / BB / US / DS / ##) |
| WATERCLARITY: | Clear (see bottom), Cloudy (>4" vis), Murky (<4" vis) | WATERCOLOR: | Colorless, Green, Yellow, Brown | | | | |
| OBSERVED FLOW: | NA, Dry Waterbody Bed, No Observed Flow, Isolated Pool, 0.1 - 1cfs, 1 - 5 cfs, 5 - 20 cfs, 20 - 50 cfs, 50 - 200 cfs, >200cfs | | | | | | 3: (RB / LB / BB / US / DS / ##) |
| Comments: | | | | | | | |

| EVENT TYPE: | Chem,Chem & Tox, Tox, Observations | SAMPLE TYPE: | Grab / Integrated | **Sample ID (If Used):** | | |
|---|---|---|---|---|---|---|
| OCCUPATION METHOD: | Walk-in, Bridge, R/V _____, Other _____ | STARTING BANK: | LB / RB/ NA | GPS/DGPS | **Lat (dd.ddddd)** | **Long (dd.ddddd)** |
| SAMPLINGEQUIPMENT: | Indiv bottle by hand, By pole, Teflon tubing, Kemmer, Pole & Beaker, Other _____ | | | **Target:** | | - |
| SAMPLE LOCATION: | Bank, Thalweg, Midchannel, Open Water | HYDROMODLOC(to sample): | US / DS / NA | ***Actual:** | | - |
| HYDROMODIFICATION: | None, Bridge, Pipes, Concrete Channel, Grade Control, Culvert, Other _____ | | | GPS Model: | | Datum: |
| Point of Sample (Integrated; -88 in dbase) | *StreamDepth (m): | *StreamWidth (m): | | Distance from Bank (m): | | Accuracy (ft / m): |

| **Samples Taken (# of containers filled)** | **Field Duplicate** (SampleType = FieldBLDup): | YES / NO | Duplicate Sample ID: ___ ___ ___ ___ ___ ___ ___ ___ |
|---|---|---|---|

| **Type (ex: TSS)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # of Containers Filled | | | | | | | | | | | | | |

**Probe Measurements**

| | Discharge (CFS) | pH | Electrical Conductivity (uS/cm) | $O_2$ (mg/L) | Water Temp (°C) | Turbidity (ntu) | *Air Temp (°C) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SUBSURFACE | | | | | | | | | | | | | |
| Instrument: | | | | | | | | | | | | | |
| Calib. Date: | | | | | | | | | | | | | |

COMMENTS: (* Indicates Optional)

# QUALITY ASSURANCE PROJECT PLAN

## 1.0 INTRODUCTION

A Quality Assurance Project Plan (QAPP) shall be developed by the Discharger and shall include site-specific information and field and laboratory quality assurance requirements. This document identifies the major elements of the quality assurance and quality control (QA/QC) components that need to be described in the QAPP. The QAPP shall be submitted to the Central Valley Water Board for review and approval.

## 2.0 OBJECTIVE

The objective of this document is to identify the QA components that should be included in the QAPP for the Discharger monitoring. A QAPP contains the requirements and criteria for the field and laboratory procedures used during planning and implementation of the monitoring program. These requirements and criteria shall be presented as a set of procedures to assure that the data collected during a monitoring program represents, as closely as possible, *in situ* conditions of the water body. This objective will be achieved by using accepted methodology (e.g., USEPA) to collect and analyze water, sediment, and biota samples. The program's ability to meet this objective will be assessed by evaluating the laboratory results in terms of detection limits, precision, accuracy, comparability, representativeness, and completeness. This document provides a description of major elements of the field and laboratory QA components.

## 3.0 WHAT SHOULD BE INCLUDED IN THE QAPP

A monitoring QAPP should include Project Management information e.g., project organization and responsibilities, project schedule, and the QA components of the field and laboratory activities. The elements described in this document will provide the framework for developing a QAPP. These elements describe the field and laboratory elements of a QAPP and the requirements that are set forth by the Central Valley Water Board. QAPP for the Discharger monitoring must include all the required components as listed in Table No. 1.

## Table No.1. Components of Monitoring QAPP

| SECTION NUMBER | SECTION NAME | SECTION DESCRIPTION |
|---|---|---|
| 1.0 | PROJECT MANAGEMENT | This section explains the overall project management. |
| 1.1 | TITLE PAGE AND APPROVAL | Description of Project Title, organizations, and responsible staff. |
| 1.2 | TABLE OF CONTENTS | Table of Contents list the sections and sub-sections included in the QAPP. |
| 1.3 | CONTRACT INFORMATION | List the contact staff, organization, and phone numbers. |
| 1.4 | PROJECT ORGANIZATION AND RESPONSIBILITY | Identify the project organization and the responsible entities who will ensure the QAPP procedures will be followed. |
| 1.5 | PROJECT OBJECTIVES AND APPROACH | Describe the objective based on the goal defined in the Conditional Waiver. Describe the approaches to meet the objectives. |
| 1.5.1 | *Measurement* | Describe the constituents that will be monitored. |
| 1.5.2 | *Project Schedule* | Identify when field studies will take place, the frequency of sampling, and when the field studies end. |
| 1.6 | QUALITY OBJECTIVES AND CRITERIA FOR DATA MEASUREMENT | Describe the quality objectives and criteria for data measurement. Refer to Quality Control Requirements listed in this document. |
| 1.7 | TRAINING AND CERTIFICATION | Describe the procedures for training field and laboratory staff. |
| 1.8 | DOCUMENTATION AND RECORDS | Describe the documentation procedure and record keeping for the monitoring program. |
| 1.8.1 | *Data to be Included in Reports* | List the laboratory and field data that will be included in the report. |
| 1.8.2 | *Reporting Format* | Explain what type of data will be included in the final report. Describe how the data that didn't meet the quality objectives will be qualified (e.g., estimated, usable, unusable). |
| 2.0 | DATA ACQUISITION | This section describes the sampling design and sample collection criteria |
| 2.1 | SAMPLING DESIGN | Describe the sampling design. |
| 2.2 | RATIONALE FOR THE DESIGN | Describe the purpose of the study. State if the design is based on a statistical or judgmental data collection method. |
| 2.2.1 | *Procedure for locating and Selecting Environmental Samples* | Describe procedures for locating and selecting the monitoring site/location(s). |
| 2.2.2 | *Classification of Measurements as Critical* | All measurements shall be classified as critical. Describe the process that will ensure that data will undergo closer scrutiny during data review. |
| 2.2.3 | *Validation of any Nonstandard methods* | List the non-standard methods that will be used and describe the procedures to validate the method. |
| 3.0 | FIELD PROCEDURES | Describe the field procedures for the elements listed below. Refer to the Field Procedures (Section 3.0) to meet the requirements for this monitoring program. |
| 3.1 | SAMPLE COLLECTION METHODS | See Section 3.0 for criteria. Describe the project specific methods. |
| 3.1.1 | *Sample Storage, Preservation and Holding Times* | See Section 3.0 for criteria. Describe the project specific procedures. |
| 3.1.2 | *Sample Identification Scheme* | See Section 3.0 for criteria. Describe the project specific procedures. |
| 3.1.3 | *Field Measurements* | See Section 3.0 for criteria. Describe the project specific methods of field measurement. |
| 3.1.4 | *QC Sample Collection* | See Section 3.0 for criteria. Describe the project specific quality control samples. |
| 3.1.5 | *Field Instrument Calibration* | See Section 3.0 for criteria. Describe the project specific methods of calibration. |
| 3.1.6 | *Decontamination Procedures* | See Section 3.0 for criteria. Describe the project specific documentation procedure. |
| 3.1.7 | *Field Documentation* | See Section 3.0 for criteria. Describe the project specific field documentation procedure. |
| 3.2 | SAMPLE CUSTODY AND DOCUMENTATION | This section describes the sample custody and documentation procedures. |
| 3.2.1 | *Documentation Procedures* | Describe the field documentation procedures. |
| 3.2.2 | *Chain-of-Custody Procedures and Form* | See Section 3.0 for criteria. Describe the Chain-of-Custody procedures. |
| 3.2.3 | *Sample Shipments and Handling* | See Section 3.0 for criteria. Describe the sample shipment procedure. How the samples will be delivered from the field to the laboratory. |
| 3.2.4 | *Laboratory Custody Procedures* | See Section 3.0 for criteria. Describe the project laboratory custody procedures. |
| 4.0 | ANALYTICAL METHOD REQUIREMENTS | This section describes the analytical method requirements. |
| 4.1 | CHEMISTRY ANALYSIS | Describe the chemistry analyses procedure, reference the published method, and identify the quantitation procedures. |
| 4.2 | TOXICITY TESTING | Describe the toxicity testing method and procedure, species, and reference the published methods being followed. |
| 4.3 | DETECTION AND QUANTITATION LIMITS | Describe the detection and quantitation limits for all constituents. See Section 4.0 for requirements. |
| 4.4 | LABORATORY STANDARDS AND REAGENTS | Describe the reagents used in the laboratory and how they are checked for the quality. |
| 4.5 | SAMPLE PREPARATION PROCEDURES | Describe the sample preparation procedure and the reference method for each analytical method used and every constituent being monitored |
| 5.0 | QUALITY CONTROL REQUIREMENTS | This section describes the laboratory and field quality control. Laboratory and field sampling SOP should be provided to include the detailed information. |
| 5.1 | DATA QUALITY OBJECTIVES AND QUALITY | Describe the precision, accuracy, comparability, and completeness criteria for |

| SECTION NUMBER | SECTION NAME | SECTION DESCRIPTION |
|---|---|---|
| | ASSURANCE OBJECTIVES | this project. See Section 5.0 for required information. |
| 5.2 | DEVELOPMENT OF PRECISION AND ACCURACY | Provide information on how the precision and accuracy will be developed for this project. See Section 5.0 for required information. |
| 5.3 | INTERNAL QUALITY CONTROL SAMPLES | Describe and list the internal QC samples, the frequency and acceptance criteria. |
| 5.4 | FIELD QUALITY CONTROL SAMPLES | Describe and list the type of field QC samples, the frequency of collection, and the acceptance criteria. |
| 5.5 | LABORATORY QUALITY CONTROL SAMPLES | Describe the laboratory QC samples and the frequency of analyses. |
| 6.0 | INSTRUMENTATION AND EQUIPMENT PREVENTATIVE MAINTENANCE | This section describes the instrumentation and preventive maintenance. |
| 6.1 | SAMPLE EQUIPMENT CLEANING PROCEDURES | Describe the sampling equipment cleaning procedures. |
| 6.2 | ANALYTICAL INSTRUMENT AND EQUIPMENT TESTING PROCEDURES AND CORRECTIVE ACTIONS | List the analytical instrument, manufacturer, maintenance procedure, and corrective actions when instruments are not operating within the required operating limits. |
| 6.3 | INSTRUMENT CALIBRATION AND FREQUENCY | This section describes the instrument calibration procedures and frequency of calibration |
| 6.3.1 | *Analytical Procedures and Calibration* | Describe the calibration procedure and frequency for each analytical method used in this monitoring program. Refer to Section 6.0 to follow the required procedure. |
| 7.0 | DATA MANAGEMENT | Describe the data management procedure. Where the original data will be kept, who will receive the copy of the data, and who is responsible for maintaining the database. |
| 7.1 | DATA ASSESSMENT PROCEDURES | How the data will be assessed and what tools will be used to assess the data. |
| 7.1.1 | *Training and Certification* | Describe the training requirements for the field and laboratory staff. |
| 7.1.2 | *Data to be included in the Report* | Specify the data that will be included in the monitoring report. See Section 7.0 for requirements |
| 8.0 | DATA VALIDATION AND USABILITY | This section describes the data validation and usability. |
| 8.1 | LABORATORY DATA REVIEW. VERIFICATION AND REPORTING | Describe the laboratory procedure for data review and validation prior to release of the data. |
| 9.0 | REFERENCES | List all the references used to prepare the QAPP. |
| | ATTACHMENTS | List and enclose the attachments required. (e.g., Laboratory Quality Assurance Manual and SOPs). |

In order to provide some technical information in preparing the QAPP, Sections 3.0 through 8.2.3 of the QAPP listed in Table No.1 are discussed in more detail below.

These sections focus primarily on the QA/QC components of the field and laboratory procedures. The section numbers provided below correspond to the Table No. 1 section numbers and section titles for ease of use.

## SECTION 3.0 FIELD PROCEDURES

Surface water and sediment samples will be collected for chemical analyses and biological toxicity testing. While the primary focus will be the collection of samples for toxicity and pesticide analyses, other constituents will be required as listed in the Monitoring and Reporting Program.

### Section 3.1 Sample Collection Methods

Proper sampling techniques must be used. Sampling procedure must be documented.

### Section 3.1.1 Sample Storage, Preservation and Holding Times

Sample containers must be pre-cleaned and certified to be free of contamination according to the USEPA specification for the appropriate methods.

Section 3.1.2 Sample Identification Scheme

All samples must be identified with a unique number to ensure that results are properly reported and interpreted. Samples must be identified such that the site, sampling location, matrix, sampling equipment and sample type (i.e., normal field sample or QC sample) can be distinguished by a data reviewer or user.

Section 3.1.3 Field Measurements

For all water bodies sampled, water quality parameters including pH, specific conductance, flow, dissolved oxygen, and temperature must be measured in the field prior to collecting samples for laboratory analyses.

Section 3.1.4 QC Sample Collection

Field blanks and duplicates must be collected at a frequency of about 1 per event or 1 per 20 normal samples whichever is more frequent. Sufficient sample volume for matrix spikes will be collected as normal samples at a frequency of 1 per event to allow for laboratory preparation and analysis at a frequency of one per batch. Sample water collected for matrix spikes will be spiked at the laboratory prior to sample preparation.

Section 3.1.5 Field Instrument Calibration

Routine field instrument calibration must be performed at least once per day prior to instrument use to ensure instruments are operating properly and producing accurate and reliable data. Calibration should be performed at a frequency recommended by the manufacturer, if more frequent than once per day. The calibration should be recorded within a field calibration log or directly on the corresponding field sheet.

Section 3.1.6 Decontamination Procedures

All field and sampling equipment that will come in contact with field samples must be decontaminated after each use in a designated area.

Section 3.1.7 Field Documentation

All field activities must be adequately and consistently documented to ensure defensibility of any data used for decision-making and to support data interpretation. Pertinent field information, including (as applicable), the width, depth, flow rate of the stream, the surface water condition, location of the tributaries, and the actual GPS coordinates where the sample was taken must be recorded on the field sheets, along with field measurements described in Section 3.1.3.

Section 3.2 Sample Custody and Documentation

Sample custody must be traceable from the time of sample collection until results are reported. Sample custody procedures provide a mechanism for documenting information related to sample collection and handling.

Section 3.2.1 Documentation Procedures

A field activity coordinator must be responsible for ensuring that the field sampling team adheres to proper custody and documentation procedures. A master sample logbook or field datasheets shall be maintained for all samples collected during each sampling event.

Section 3.2.2 Chain-of-Custody Form

A chain-of-custody form must be completed after sample collection and prior to sample shipment or release. The chain-of-custody form, sample labels, and field documentation must be crossed checked to verify sample identification, type of analyses, number of containers, sample volume, preservatives and type of containers.

Section 3.2.3 Sample Shipments and Handling

All sample shipments are accompanied with the chain-of-custody form, which identifies the contents. The original chain-of-custody form accompanies the shipment and a copy is retained in the project file.

All shipping containers must be secured with chain-of-custody seals for transportation to the laboratory. The samples must be placed with ice to maintain the temperature between 2-4 degrees C. The ice packed with samples must be sealed in zip lock bags and contact each sample and be approximately 2 inches deep at the top and bottom of the cooler. Samples must be shipped to the contract laboratories according to Department of Transportation standard.

Section 3.2.4 Laboratory Custody Procedures

The following sample control activities must be conducted at the laboratory:

- Initial sample login and verification of samples received with the chain-of-custody form;
- Document any discrepancies noted during login on the chain-of-custody;
- Initiate internal laboratory custody procedure;
- Verify sample preservation (e.g., temperature);
- Notify the project coordinator if any problems or discrepancies are identified; and
- Proper sample storage, including daily refrigerator temperature monitoring and sample security.

## SECTION 4.0 ANALYTICAL REQUIREMENTS

Section 4.1 Chemistry Analyses

Pesticide analyses must be conducted on unfiltered (whole) fractions of the samples. Prior to the analysis of any environmental samples, the laboratory must have demonstrated the ability to meet the minimum performance requirements for each analytical method. Initial demonstration of laboratory capabilities includes the ability to meet the project specified quantitation limits (QL), the ability to generate acceptable precision and recoveries, and other analytical and QC parameters as stated in this Guide. Analytical methods used for chemistry analyses must follow a published method and document the procedure for sample analyses in a laboratory standard operation procedure (SOP) for review and approval.

Section 4.2 Toxicity Testing

The ambient water toxicity test results must provide a reliable qualitative prediction of impacts to in stream biota. At a minimum the toxicity testing will need to include the 4-day static renewal procedures described in *Method for Measuring Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (USEPA, 2002).

Section 4.3 Detection and Quantitation Limits

*Method Detection Limit Studies*

Each laboratory performing analyses under this program must routinely conduct method detection limit (MDL) studies to document that the MDLs are less than the project-specified QLs. If any analytes have MDLs that do not meet the project QLs, the following steps must be taken:

1. Perform a new MDL study using concentrations sufficient to prove analyte quantitation at concentrations less than the project-specified QLs per the procedure for the Determination of the Method Detection Limit presented in Revision 1.1," 40 Code of Federal Regulations 136, 1984.
2. No samples may be analyzed until the issue has been resolved. MDL study results must be available for review during audits, data review, or as requested. Current MDL study results must be reported at the beginning of every project for review and inclusion in project files.

An MDL is developed from seven aliquots of a standard containing all analytes of interest spiked at five times the expected MDL, which are taken through the analytical method sample processing steps. The data are then evaluated and used to calculate the MDL. If the calculated MDL is less than three times below the spiked concentration, another MDL study must be performed using a lower concentration.

*Project Quantitation Limits*

Laboratories generally establish QLs that are reported with the analytical results; these may be called reporting limits, detection limits, reporting detection limits, or other terms. These laboratory limits must be less than or equal to the project QLs. Project QLs must be lower than the proposed or existing numeric water quality objectives by the Central Valley Water Board. The laboratories must have documentation to support quantitation at the required levels.

Laboratories must report analytical results between the MDL and QL. These results must be reported as numerical values and qualified as estimates. Reporting as "trace" or "<QL" is not acceptable. Sample results less than MDLs will be reported only for GC/MS analyses if the mass spectral fingerprint can prove positive identification; these results must be qualified as estimated values by the laboratory.

Section 4.4 Laboratory Standards and Reagents

All stock standards and reagents used for extraction and standard solutions must be tracked through the laboratory. The preparation and use of all working standards must be recorded in bound laboratory notebooks that document standard tractability to U.S. EPA, A2LA or National Institute for Standards and Technology (NIST) criteria. Records must have sufficient detail to allow determination of the identity, concentration, and viability of the standards including any dilutions performed to obtain the working standard. Date of preparation, analyte or mixture, concentration, name of preparer, lot or cylinder number, and expiration date, if applicable, must be recorded on each working standard.

Section 4.5 Sample Preparation Methods

Surface water and sediments samples will be prepared in solvent or via other extraction techniques prior to sample analyses. All procedures must follow a published method. The sample preparation procedure must be documented and included in the monitoring plan for review and approval.

## SECTION 5.0 QUALITY CONTROL REQUIREMENTS

The types of QC assessments required in the monitoring program are discussed below. Detailed procedures for preparation and analysis of QC samples must be provided in the analytical method documents or Standard Operating Procedures (SOP) by the analytical laboratories for approval.

Section 5.1 Quality Assurance Objectives (QAOs)

QAOs are the detailed QC specifications for precision, accuracy, representativeness, comparability, and completeness. The QAOs are then used as comparison criteria during data quality review by the group that is responsible for collecting data to determine if the minimum requirements have been met and the data may be used as planned.

Section 5.2 Development of Precision and Accuracy Objectives

Laboratory control spikes (LCSs) are used to determine the precision and accuracy objectives. The laboratory fortifies the LCSs with target compounds to monitor the laboratory precision and accuracy. Field duplicates measure sampling precision and variability for comparison of project data. Acceptable relative percent difference (RPD) is less than 25 for field duplicate analyses. If field duplicate sample results vary beyond these objectives, the results are qualified.

Section 5.3 Internal Quality Control

Internal QC is achieved by collecting and/or analyzing a series of duplicate, blank, spike, and spike duplicate samples to ensure that analytical results are within the specified QC objectives. The QC sample results are used to quantify precision and accuracy and identify any problem or limitation in the associated sample results. The internal QC components of a sampling and analyses program will ensure that the data of known quality are produced and documented. The internal QC samples, frequency, acceptance criteria, and corrective action must meet the minimum requirements presented in the following sections.

Section 5.4 Field Quality Control

Field QC samples are used to assess the influence of sampling procedures and equipment used in sampling. They are also used to characterize matrix heterogeneity.

For basic water quality analyses, QC samples to be prepared in the field will consist of field blanks, field duplicates, and matrix spikes (when applicable). The number of field duplicates and field blanks are set to achieve an overall rate of at least 5% of all analyses for a particular parameter. The external QA samples are rotated among sites to achieve the overall rate of 5% field duplicate samples and 5% field blanks (as appropriate for specific analyses).

Field Blanks

A field blank is designed to assess potential sample contamination levels that could occur during field sampling and sample processing. Field blanks are taken using deionized water in the field, transferred to the appropriate container, preserved (if appropriate), and otherwise treated the same as the corresponding sample type during the course of a sampling event. Field blanks are to be collected using deionized water which is taken to the field and passed through sampling devices into containers at 1 per event for the following constituents: trace metals in water (including mercury), VOA samples in water and sediment, DOC samples in water, and bacteria samples. Field blanks for other media and analytes should be conducted upon initiation of sampling, and if field blank performance is acceptable, further collection and analysis of field blanks for these other media and analytes need only be performed on an as-needed basis, or during field performance audits.

Travel Blanks

The purpose of the travel blank is to determine if there is any cross contamination of volatile constituents between sample containers. One VOA sample vial with deionized water free of volatile contaminants is transported to the site, handled like a sample (but never opened up), and returned to the laboratory for analysis. One travel blank for each batch of VOA samples shipped to the laboratory is required. Travel blanks are not required for other analytes, but are encouraged to be utilized for other analytes as possible and appropriate.

Field Duplicates

Field duplicates will be collected at the rate of one per sampling event, and analyzed along with the associated environmental samples. Field duplicates will be collected at the same time as environmental samples or of two grab samples collected in rapid succession. If the RPD of field duplicate results is greater than 25% and the absolute difference is greater than the RL, both samples should be reanalyzed.

Section 5.5 Laboratory Quality Control

For basic water quality analyses, QC samples prepared in the contract laboratory will typically consist of method blanks, laboratory control samples, laboratory duplicates, and surrogate added to each sample (organic analysis). If the results of the analysis of laboratory quality control samples falls outside of the Central Valley Water Board approved quality control acceptance criteria then the entire sample batch must be reanalyzed with new laboratory quality control samples.

Method Blanks

Method blanks will be prepared and analyzed by the contract laboratory at the rate of one per sample batch. If any analyte is detected in the blank, the blank and the associated samples must be re-extracted and re-analyzed.

Laboratory Control Samples and Surrogate Spiking

Laboratory control samples (LCS) will be analyzed at the rate of one per sample batch. A surrogate may be added to samples for organic analyses. Laboratory acceptance criteria for surrogate or control sample recovery must be submitted to Central Valley Water Board staff within the quality assurance control plan for review and approval.

Matrix Spikes and Matrix Spike Duplicates

Matrix spikes and matrix spike duplicates will be analyzed at the rate of one pair per sample batch. Matrix spike samples are collected at the same time as the environmental samples and are spiked at the laboratory. Matrix spiking must be performed on actual project samples with each batch. Laboratory acceptance criteria should be submitted within the quality assurance control plan to the Central Valley Water Board staff for review and approval.

## SECTION 6.0 INSTRUMENTATION AND EQUIPMENT PREVENTIVE MAINTENANCE

Section 6.1 Sample Equipment Cleaning Procedures

Equipment used for sample collection must be cleaned according to the specific procedures documented in each sampling SOP. Sampling SOP will be prepared by the group responsible for sampling and will be submitted to Central Valley Water Board for review and approval as part of the monitoring plan and quality assurance project plan..

Section 6.2 Analytical Instrument and Equipment Testing Procedures and Corrective Actions

Testing, inspection, maintenance of analytical equipment used by the contract laboratory, and corrective action shall be documented in the QA manuals for each analyzing laboratory. Laboratory Quality Assurance Manual must be submitted to Central Valley Water Board for review and approval prior to start of sampling and analyses.

Section 6.3 Instrument Calibrations and Frequency

Section 6.3.1 Analytical Procedures and Calibration

This section briefly describes analytical methods and calibration procedures for samples that will be collected under this monitoring program.

Analytical methods that will be used in this program will need to follow the general guidance of any of the following methods, although specific method modifications may be approved by the Executive Officer of the Central Valley Water Board if sufficient justification is provided.

- *Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater* (EPA-600/4-85- 054)
- *U.S. EPA Methods for Chemical Analysis of Water and Wastes* (EPA-600/4-79-020, third edition, 1983)
- *Methods for Determination of Organic Compounds in Drinking Water* (EPA-600/4-88/039)
- *Standard Methods for the Examination of Water and Wastewater*
- *USEPA. 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. Office of Water, Washington, D.C. EPA-821-R-02-01*
- *USEPA. 2002. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition. Office of Water, Washington, D.C. EPA-821-R-02-013*
- *USEPA. 1994. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates. Office of Research and Development, Washington, D.C. EPA-600-R-94-024*. Modifications to the procedure for *Hyallela Azteca* with respect to the growth endpoint may be requested.

For this program, only linear calibration with either an average response factor or a linear regression is acceptable for organic analyses. Non-linear calibration is not allowed since using this calibration option creates a potential for poor quantitation or biased concentrations of compounds at low or high concentrations (near the high and low ends of the calibration range.

Laboratories shall prepare an initial 5-point calibration curve, where the low level standard concentrations is less than or equal to the analyte quantitation limits.

## SECTION 7.0 RECORD AND DATA MANAGEMENT

Copies of field logs, a copy of chain-of-custody forms, original preliminary and final lab reports, and electronic media reports must be kept for review by the Central Valley Water Board Staff. The field crew must retain original field logs. The contract laboratory shall retain original chain-of-custody forms. The contract laboratory will retain copies of the preliminary and final data reports.

Concentrations of chemicals and toxicity endpoints, and all numerical biological parameters shall be calculated as described in the referenced method document for each analyte or parameter, or laboratory operating procedures. The data generated shall be converted to a SWAMP comparable database format maintained by the responsible party and available for electronic data submission to the Central Valley Water Board staff. After data entry or data transfer procedures are completed for each sample event, data should be inspected for data transcription errors, and corrected as appropriate. After the final QA checks for errors are completed, the data should be added to the final database Quality assurance checks shall be preformed at a project level prior to submission within monitoring reports and electronic data submittals.

### Section 7.1 Data Assessment Procedures

Data must be consistently assessed and documented to determine whether project QAOs have been met, quantitatively assess data quality, and identify potential limitations on data use. Assessment and compliance with QC procedures should be under taken throughout the project to ensure the accuracy of sample collection, laboratory analysis, exceedances communications, and the submitted monitoring reports. Data communicated to Central Valley Water Board staff will be considered draft until the reception of the monitoring report of which the specific data is formally reported.

### Section 7.1.1 Training and Certification

All staff performing field, laboratory, data entry, and data quality assurance procedures shall receive training to ensure that the work is conducted correctly and safely as applicable. At a minimum, all staff shall be familiar with the field guidelines and procedures and the laboratory SOP included in the project QAPP.

### Section 7.1.2 Data to be Included in Data Reports

For each sampling event, the field team or monitoring agency shall provide the Project Lead Staff with copies of the field data sheets (relevant pages of field logs) and copies of the chain-of-custody forms for all samples submitted for analysis. At minimum, the following sample-specific information must be provided for each sampling event to the Central Valley Water Board staff:

- Sample Identification
- Monitoring location
- Sample type, e.g. grab or composite type (Cross-sectional, flow-proportional, etc.)
- QC sample type and frequency
- Date and time(s) of sample collection
- Requested analyses (specific parameters or method references)
- Results of samples collected and all laboratory QC samples (calibrations, blanks, surrogates, laboratory spikes, matrix spikes, reference materials, etc.) and the identification of each analytical sample batch

- Results for tests run prior to toxicity analyses, such as dissolved oxygen, temperature, electrical conductivity, hardness, and ammonia
- Any anomalies regarding sample condition noted by the laboratory
- Report of any adjustments made to samples prior to running toxicity tests, such as for dissolved oxygen, alkalinity, dechlorination, or other

Section 7.1.3 Reporting Format

All results meeting data quality objectives and results having satisfactory explanations for deviations from objectives shall be reported on the Laboratory Final Report to the Project Manager. The final results shall include the results of all field and laboratory QC samples requested through the original chain-of-custody forms. Original laboratory data and reports shall be retained by the Project Management and copies shall be submitted to the Central Valley Water Board when required. In addition to the paper laboratory reports, the Project Manager may have the option to request the results of all field and laboratory QC samples within an electronic format. It would be the dual responsibility of the laboratory and Project management to ensure that the data was free from errors. The Project management shall have the overall responsibility of meeting the formatting guidelines for all electronic data for submission to the Central Valley Water Board.

## SECTION 8.0 DATA VALIDATION AND USABILITY

Section 8.1 Laboratory Data Review, Verification, and Reporting

The quality assurance project plan must be used to accept, reject or qualify the data generated by the laboratory. The Project Manager shall convey the quality assurance acceptance criteria to the laboratory management. The laboratory management will be responsible for validating the data generated by the laboratory.

The laboratory personnel must verify that the measurement process was "in control" (i.e., all specified data quality objectives were met or acceptable deviations explained) for each batch of samples before proceeding with analysis of a subsequent batch. In addition, each laboratory will establish a system for detecting and reducing transcription and/or calculation errors prior to reporting data.

Only data, which have met data quality objectives, or data, which have acceptable deviations explained will be submitted by the laboratory. When QA requirements have not been met, the samples will be reanalyzed when possible and only the results of the reanalysis will be submitted, provided they are acceptable. The Project Manager will be responsible for determining if the validated laboratory data meets the project quality assurance acceptance criteria.

Section 8.2 Data System Audits

The Central Valley Water Board staff may audit laboratories during conducting sample analyses for this program.

Section 8.2.1 Technical System Audit:

A technical system audit is a quantitative review of a sampling or analytical system. Qualified technical staff members perform audits. The laboratory system audit results are used to review operations and ensure that the technical and documentation procedures provide valid and defensible data.

Section 8.2.2 Performance Evaluation Audits

Performance evaluation audits quantitatively assess the data produced by a measurement system. Performing an evaluation audit involves submitting certified samples for each analytical method. The matrix standards are selected to reflect the concentration range expected for the sampling program Any problem associated with PE samples must be evaluated to determine the influence on field samples analyzed during the same time period. The laboratory must provide a written response to any PE sample result deficiencies.

Section 8.2.3 Field Technical Audits

The contractor should routinely observe field operations to ensure consistency and compliance with sampling specifications presented in this document and QAPP that will be developed later. An audit checklist should document field observations and activities.

## SECTION 9.0 REFERENCES

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U.S. EPA. 1983. Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, third edition

U.S. EPA.1988. Methods for Determination of Organic Compounds in Drinking Water (EPA-600/4-88/039)

USEPA. 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. Office of Water, Washington, D.C. EPA-821-R-02-012

USEPA. 2002. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition. Office of Water, Washington, D.C. EPA-821-R-02-013

USEPA. 1994. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates. Office of Research and Development, Washington, D.C. EPA-600-R-94-024

USEPA. 1998. Methods for Aquatic Toxicity Identification Evaluations. Phase I Toxicity Characteristics Procedures. Office of Research and Development, Duluth, Minnesota. EPA-600-3-88-034.

Standard Methods for the Examination of Water and Wastewater, American Public Health Association, American Water Works Association, Water Environment Federation.

USEPA Test Methods for Evaluating Solid Waste, Physical Chemical Methods, SW 846

## MRP Attachment C: Example Table for Providing Tabulated Monitoring Results

| # | Location | Date | Time | Sample Identification | Constituent | Detection Result | Reporting Limit | Units | Receiving Water Limitation | Lowest LC50 for Fresh Water Organisms (ug/L) | Exceedance Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Spill A | 7/14/04 | 11:05 | Field Parameter | Temperature | | | C | | | |
| 3 | | | 11:05 | Field Parameter | Electrical Conductivity | | | uS/cm | 150 | | |
| 6 | | | 11:05 | Field Parameter | Dissolved Oxygen | | | mg $O_2$/L | 8 | | High number I) |
| 7 | | | 11:05 | Field Parameter | pH | | | units | 6.8-8.5 | | |
| 8 | | | 11:15 | Equipment Blank | Glyphosate | | 5 | ug/L | 700 | | |
| 9 | | | 11:37 | WD1 | Triclopyr | | 0.5 | ug/L | | | |
| 10 | | | 11:52 | HF HS 1 | Bromacil | | 0.5 | ug/L | | | |
| 11 | | | 11:52 | HF HS 2 | Diuron | | 0.5 | ug/L | 14 | | |
| 12 | | | 11:56 | HF HS 3 | Glyphosate | | 5 | ug/L | 130 | | |
| 13 | | | 11:59 | HF HS 4 | Oxyflourfen | | 0.5 | ug/L | | | |
| 14 | | | 12:01 | HF HS 5 | Triclopyr | | 0.5 | ug/L | | | |
| 15 | | | 12:03 | HF HS 6 | Pendimethalin | | 0.5 | ug/L | | | |
| 16 | | | 12:05 | HF HS 7 | TDS | | 10 | mg/L | 100 | | |
| 17 | | | 12:05 | HF HS 8 | Turbidity | | 0.5 | NTU | 1 | | |
| 18 | | | 12:07 | HF HS 9 | TKN | | 500 | ug/L | | | |
| 20 | | | 12:09 | HF HS 11 | Potassium | | 500 | ug/L | | | |
| 21 | | | 12:11 | HF HS 12 | TOC | | 0.30 | ug/L | | | |
| 1 | Creek B | 7/14/04 | 12:45 | Field Parameter | Temperature | | | C | | | |
| 3 | | | 12:45 | Field Parameter | Electrical Conductivity | | | uS/cm | 150 | | |
| 6 | | | 12:45 | Field Parameter | Dissolved Oxygen | | | mg $O_2$/L | 8 | | |
| 7 | | | 12:45 | Field Parameter | pH | | | Units | 6.8-8.5 | | |
| 8 | | | 12:55 | WD-2 | Pendimethalin | | 0.5 | ug/L | | | |
| 9 | | | 12:56 | WD-3 | TDS | | 10 | mg/L | 100 | | |
| 10 | | | 13:05 | HF CM 1 | Bromacil | | 0.5 | ug/L | | | |
| 11 | | | 13:05 | HF CM 2 | Diuron | | 0.5 | ug/L | 14 | | |
| 12 | | | 13:06 | HF CM 3 | Glyphosate | | 5 | ug/L | 130 | | |
| 13 | | | 13:07 | HF CM 4 | Oxyflourfen | | 0.5 | ug/L | | | |
| 14 | | | 13:08 | HF CM 5 | Triclopyr | | 0.5 | ug/L | | | |
| 15 | | | 13:10 | HF CM 6 | Pendimethalin | | 0.5 | ug/L | | | |
| 16 | | | 13:12 | HF CM 7 | TDS | | 10 | mg/L | 100 | | |
| 17 | | | 13:12 | HF CM 8 | Turbidity | | 0.5 | NTU | 1 | | |
| 18 | | | 13:14 | HF CM 9 | TKN | | 500 | ug/L | | | |
| 20 | | | 13:15 | HF CM 11 | Potassium | | 500 | ug/L | | | |
| 21 | | | 13:17 | HF CM 12 | TOC | | 0.30 | ug/L | | | |

**Exceedances and Commnets**

I) High number, check the sampling point, maybe it should be taken before the spill to reduce aeration effect on the sample.